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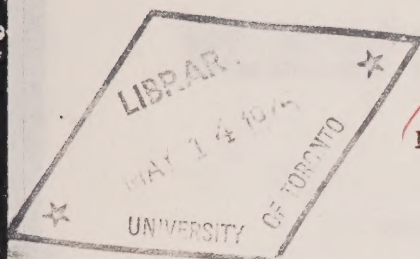


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by

M.V. GEORGE

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MORTALITY TRENDS IN CANADA, 1926-1965*

by.

M.V. George, Ph.D.

Demographer
Demographic Analysis and Research Section
Dominion Bureau of Statistics, Ottawa

Introduction

1. The purpose of this paper is to survey briefly the trends and patterns of mortality in Canada during 1926-1965 (since the inclusion of Quebec in the national vital statistics system in 1926)¹ and to examine the prospects for an increase in average longevity. Vital statistics and life tables are the main source of data used for this analysis.
2. Canada has had low death rates since 1926 (the crude death rates have been less than 12 per thousand population) which registered a fairly steady decline up to 1954. After 1954, despite the advances in social and medical care, the trend in death rates had been fairly stable for both sexes. The annual crude death rates varied between 8.2 and 7.6 during 1954 to 1965. Thus while the rate of decline in crude death rate was 28.1 per cent between 1926 and 1954, it was only 7.3 per cent between 1954 and 1965. The fairly stable trend in death rate in recent years may not be surprising because it is obviously impossible for the death rate to decline indefinitely. Further, with an aging population it is possible for the death rate to increase even if there is no change in age-specific death rates². In this context, a number of questions may be asked on the future course of mortality:
 - a. Has Canada reached the irreducible minimum level in death rate?
 - b. Is the recent stable trend in death rate a temporary phenomenon or does it indicate the starting of a new trend with the prospect of an eventual increase in mortality?
 - c. What implications do recent mortality trends and pattern have on future population growth and life expectancy? A comparison of the Canadian mortality situation with the mortality level and pattern of countries of traditionally low mortality (the Western European and English speaking countries elsewhere), and

an examination of the possible medical break through in controlling the major causes of current deaths may indicate the prospects of mortality in Canada.

General mortality trend

3. During the period 1926-1965 the crude death rate in Canada dropped from 11.4 to 7.6 per 1,000 population, a decrease of 33 per cent³. Graph 1 shows the trends in crude death rates and standardised death rates (standardised with respect to the age distributions of the 1956 census of Canada) for the period 1926-1965. The fluctuations in the crude death rates during the period are brought about not only by changes in the health conditions but also by changes in the characteristics of the population, particularly the age distributions. A comparison of the crude and standardised death rates indicates the effect of a change in age distribution on the crude death rates. There are less variations in the trend of standardised rates which show a fairly steady downward trend. Thus, the standardised death rates which remove the effects of changing age composition of the population portray a clear picture of the mortality trend. As observed in para 2, two clear trends may be seen from Graph 1: i. the fairly continuous decline in the trend from 1926 to 1954; and ii. the leveling off of the death rate since 1954.

International comparison of mortality trends

4. Among the countries which have fairly reliable vital statistics, Canada has one of the lowest crude death rates. Of such countries, Japan (7.1), Soviet Russia (7.3) and Poland (7.4) had lower death rates compared with Canada in 1965⁴. If the comparison of death rates is made between West European and English speaking countries elsewhere, Canada had the lowest crude death rate in 1965. However, where the comparison was made using age specific death rates, it was found that for each sex, the lowest death rates were experienced in Norway, with Netherlands a close second; and Canada either 7th or 8th in 1960⁵.

5. The tendency for the death rates to be leveled off in recent years can be noticed in most of the countries compared here. In fact, in few countries, such as Norway, the Netherlands and Denmark the trend in crude death rates during recent years has been upward which may be the effect of changes in the age distribution on death rate⁶.

Trend of death rate by age and sex

6. The age specific death rates by five year age groups for males and females in 1926 and 1964 are presented in Table 1. The general pattern of mortality throughout life for both sexes in both the years remains constant - the death rate declines from birth to about age 10, increases gradually from age 10 to 45, and from then increases rapidly throughout the rest of life. However, within the general pattern of mortality there has been marked changes in the death rates during the

period under consideration which are shown by the ratios of 1926 to 1964 death rates (see Table 1 and Graph 2). The highest improvement in mortality occurred for children below 15 for males; and for females the children group and the young adults gained. For children the mortality improvement between 1926 and 1964 was 8 to 9 times the rate in 1926. The rate of change in the older ages was very little for both males and females. For age group 60-64 the male death rate in 1964 was higher than the rate in 1926. Unlike females, the rate of change for males between 15 and 40 was only moderate. The changes in age specific death rates shown in Table 1 indicate that the decline in death rates was mostly brought about by decline in infant and childhood mortality.

TABLE 1. Age specific death rate (per 1,000 population) by sex: Canada, 1926 and 1964

Age Group	Male		Female		1926 1964	
	1926	1964	1926	1964	Male	Female
Under 1 ..	112.9	27.8	90.0	21.4	4.1	4.2
1-4	9.0	1.1	8.2	0.9	8.2	9.1
5-9	2.5	0.6	2.1	0.4	4.2	5.3
10-14	2.1	0.5	1.8	0.3	4.2	6.0
15-19	2.9	1.2	2.9	0.5	2.4	5.8
20-24	3.5	1.8	4.0	0.6	1.9	6.7
25-29	3.5	1.5	4.1	0.6	2.3	6.8
30-34	3.7	1.7	4.6	0.9	2.2	5.1
35-39	4.8	2.2	5.6	1.3	2.2	4.3
40-44	5.9	3.6	6.1	2.0	1.6	3.1
45-49	7.4	5.7	7.5	3.2	1.3	2.3
50-54	10.1	9.5	9.5	5.1	1.1	1.9
55-59	15.7	15.0	13.5	7.7	1.1	1.8
60-64	23.7	25.0	21.0	12.8	0.9	1.6
65-69	38.1	35.5	35.0	20.3	1.2	1.7
70-74	62.6	54.1	54.0	32.8	1.2	1.6
75-79	101.6	80.1	92.8	55.7	1.2	1.7
80-84	152.5	121.3	144.5	96.9	1.3	1.5
85+	252.6	198.8	274.3	182.3	1.3	1.5
All ages	11.9	8.8	10.9	6.3	1.4	1.7

Source: Computed from DBS, Vital Statistics, 1961 Table D6; and 1964, Table D5.

7. An examination of the trend in death rates for each age group during 1926-64 shows that the highest percentage reduction in mortality occurred for infants and children (see Table 2). The percentage of decline in age-specific death rates during the period 1926-30 to 1964 varied between 86.6 per cent (1-4 age group) and 2.2 per cent (60-69 age group) for males. The corresponding decline in death rates for females varied between 87.8 per cent in 1-4 group and 28.2 per cent in the age group 70 and above. The downward trend for every age group has

slackened substantially during the recent years; and for many age groups the death rates have almost leveled off.

TABLE 2. Trends in age specific death rates (per 1,000 population) by sex: Canada, 1926-1964

Age	1926-30 Average	1936-40 Average	1946-50 Average	1951-55 Average	1956-60 Average	1964	% decline 1926-30 to 1964
Male:							
0-1 ...	103.2	71.5	49.2	39.0	33.1	27.8	73.1
1-4 ...	8.5	5.5	2.7	1.9	1.4	1.1	86.6
5-9 ...	2.6	1.8	1.2	0.9	0.7	0.6	75.8
10-14 ..	2.0	1.4	0.9	0.7	0.6	0.5	77.2
15-19 ..	2.9	2.0	1.5	1.3	1.2	1.2	60.2
20-29 ..	3.7	2.6	1.9	1.8	1.6	1.6	55.9
30-39 ..	4.3	3.4	2.5	2.2	2.0	1.9	54.1
40-49 ..	6.8	6.0	5.4	4.8	4.6	4.6	31.5
50-59 ..	12.9	12.8	12.7	12.7	12.4	12.0	7.4
60-69 ..	30.3	30.0	29.9	29.4	29.7	29.6	2.2
70+	96.0	93.0	87.2	85.2	86.6	87.0	9.3
Female:							
0-1 ...	82.8	56.6	38.7	30.6	26.1	21.4	74.2
1-4 ...	7.5	4.7	2.2	1.6	1.2	0.9	87.8
5-9 ...	2.3	1.6	0.8	0.6	0.5	0.4	82.8
10-14 ..	1.9	1.2	0.7	0.4	0.4	0.3	83.8
15-19 ..	2.8	1.7	1.1	0.6	0.5	0.5	82.3
20-29 ..	4.0	2.6	1.5	0.9	0.7	0.6	84.8
30-39 ..	4.9	3.6	2.1	1.5	1.2	1.1	77.6
40-49 ..	6.6	5.3	4.1	3.4	2.9	2.6	61.4
50-59 ..	11.4	10.4	8.7	7.7	7.0	6.3	44.8
60-69 ..	26.5	24.3	21.1	19.1	17.7	16.2	38.9
70+	92.3	86.2	78.8	73.1	70.7	66.3	28.2

Source: DBS, Vital Statistics, 1964, p.20.

8. During the period under review the infant mortality rate has fallen by 73.7 per cent, from a rate of 93.9 in 1926-30 to 24.7 in 1964⁷. The major portion of the total decline in infant mortality during 1926-64 occurred between 1926 and 1954 (66.0 per cent). Between 1954 and 1964 the share of the total fall in infant mortality was only 7.7 per cent (the rate in 1954 was 31.9). The trends in infant mortality for males and females since 1926 are portrayed in Graph 3. It shows that infant mortality rate has always been higher for males and that the discrepancy between male and female rates has been slightly diminished between 1926 and 1964. The graph also shows the slackening in the infant mortality decline for both the sexes in the recent years.

9. The change in the infant mortality trend for Canada appears to have been the result of a combination of factors. According to a

recent study by the Health and Welfare Division of the DBS⁸, much of the reduction in infant death rate over the period is due to low mortality from diarrhoea and enteritis, influenza, bronchitis, and pneumonia, and the virtual elimination of whooping cough as a leading cause of death. Most of these reductions had been effected by 1951. Since then, improvements in mortality had been slackened because of the steady toll from such causes as immaturity, congenital malformations, asphyxia and atelectasis, and accidents.

10. At all ages mortality decline for females had been higher than males despite the fact that in 1926-30 female death rates were already lower than those for males in most of the ages. It can be seen from Graph 4 that there has been an increase in the ratio of male death rate to female death rate for all the ages over time. The ratio of male to female death rate was highest in the ages 15-30 and lowest for the youngest and oldest ages. The ratios of the male to the female death rate for each age group are presented in Table 3 and Graph 4. In 1926-30 this ratio varied between 0.86 for 30-34 age group, implying lower male death rate, and 1.25 for age 0. But in 1964 the ratios varied between 1.09 for ages 85 and over and 3.00 for ages 20-24. The increasing difference between male and female mortality decline was shown in the trend in life expectancy as well. The female gain in expectation of life at birth from 52.1 years in 1930-32 to 74.2 years in 1960-1962 is considerably larger than the corresponding male gain from 60.0 to 68.4 years⁹.

TABLE 3. Ratio of male to female death rates by age: Canada, 1926-1964

Age	1926-30	1930-35	1941	1951	1956	1961	1964
0	1.25	1.28	1.29	1.26	1.22	1.29	1.30
1-4 ...	1.13	1.15	1.18	1.17	1.14	1.30	1.22
5-9 ...	1.13	1.27	1.31	1.43	1.60	1.50	1.50
10-14 ..	1.05	1.08	1.40	1.60	1.50	2.00	1.67
15-19 ..	1.04	1.10	1.33	1.56	2.40	2.40	2.40
20-24 ..	0.95	0.97	1.30	1.90	2.83	2.83	3.00
25-29 ..	0.91	0.88	1.08	1.64	2.00	2.14	2.50
30-34 ..	0.86	0.85	1.00	1.40	1.80	1.78	1.89
35-39 ..	0.89	0.89	1.12	1.25	1.53	1.64	1.69
40-44 ..	0.98	1.02	1.11	1.30	1.42	1.70	1.80
45-49 ..	1.06	1.06	1.22	1.42	1.57	1.81	1.78
50-54 ..	1.10	1.14	1.31	1.60	1.68	1.81	1.86
55-59 ..	1.17	1.14	1.30	1.59	1.76	1.90	1.95
60-64 ..	1.15	1.16	1.31	1.52	1.62	1.88	1.95
65-69 ..	1.14	1.14	1.23	1.41	1.60	1.67	1.75
70-74 ..	1.14	1.14	1.24	1.31	1.44	1.58	1.65
75-79 ..	1.11	1.09	1.20	1.20	1.24	1.38	1.44
80-84 ..	1.05	1.08	1.13	1.12	1.20	1.24	1.25
85+	0.99	1.05	1.06	1.11	1.12	1.09	1.09
All ages	1.09	1.10	1.19	1.30	1.34	1.39	1.40

Source: DBS, Vital Statistics, 1964, Pages 102 to 105.

Major causes of death

11. The discussion so far has shown that there has been a marked shift in the pattern of mortality trends during 1926-1964. The observed shift is the result of change in the effect of certain diseases on the level and pattern of mortality. Diseases of infectious origin which were once the major causes of death have been practically eliminated as a result of improved sanitation, wonder drugs, immunization and new therapeutic procedures and advances in social environment. At the same time the relative importance of accidents, chronic diseases and cardiovascular diseases as causes of death have increased. Hence, a brief analysis of the trends of various diseases and their effects on the pattern of deaths may provide some clues to the problem of change in the general mortality level.

12. The examination of disease specific mortality is limited to the major causes of death in Canada, for each age sex group. Table 4 gives the percentage of deaths due to selected diseases in 1926 and 1965. It can be seen from this table that the leading causes of death have changed over time in Canada. The infectious and communicable diseases which were the leading causes of death in 1926 (1st rank) have become least important in 1965 (9th rank). In 1965 the first five leading causes of death, namely, diseases of the circulatory system (cardio-vascular renal diseases), neoplasms (cancer), diseases of the nervous system, accidents and diseases of the respiratory system together were responsible for 84.1 per cent of all deaths. The sex distribution of deaths by cause of death shows that all the leading causes of death have taken a greater toll of male lives compared with female lives. The highest disparity is now for deaths due to accidents. Of the accidental causes of death, motor vehicle accidents alone constitutes 50 per cent of the total accidental deaths (excluding poisoning and violence).

TABLE 4. Percentage of deaths by cause of death and sex ratio, Canada, 1926 and 1965

Diseases	1926			1965		
	Both	M/F	Rank	Both	M/F	Rank
	Sexes	Deaths		Sexes	Deaths	
Infectious diseases	17.4	0.96	1	0.8	1.62	9
Diseases of the circulatory system	15.5	1.12	2	40.2	1.54	1
Neoplasms (Cancer)	11.0	0.91	3	17.7	1.21	2
Diseases of the digestive system ..	10.3	1.23	4	3.7	1.72	7
Diseases of the respiratory system	9.9	1.18	5	5.8	1.77	5
Diseases of early infancy	9.2	1.38	6	3.8	1.42	6
Diseases of the nervous system	7.6	1.09	7	11.7	0.95	3
Diseases of the genito urinary system	6.4	1.26	8	1.8	1.65	8
Accidents, poisoning, violence	5.5	2.97	9	8.7	2.46	4

Source: DBS, Vital Statistics, 1926, Table 28; 1965, Table 15.

13. The impact of the aforesaid leading causes of death was not the same for the sexes and ages. Certain diseases like cardiovascular diseases and cancer affected mostly the middle and later years of life. The death rates by age and sex for selected diseases for Canada¹⁰ show that (a) death rates are higher for males compared with females from all the main causes of death; (b) except for diseases of the respiratory system, the death rates for the main diseases are higher for the middle and later years of life; (c) the main causes of death for infants are diseases of the respiratory system and accidents, poisoning and violence and (d) for all causes, the death rates are lowest for ages 15-24. However, because accidental deaths are mostly due to motor vehicle accidents, death rates for accidents are higher for the young adult population compared with their death rates for other causes of death.

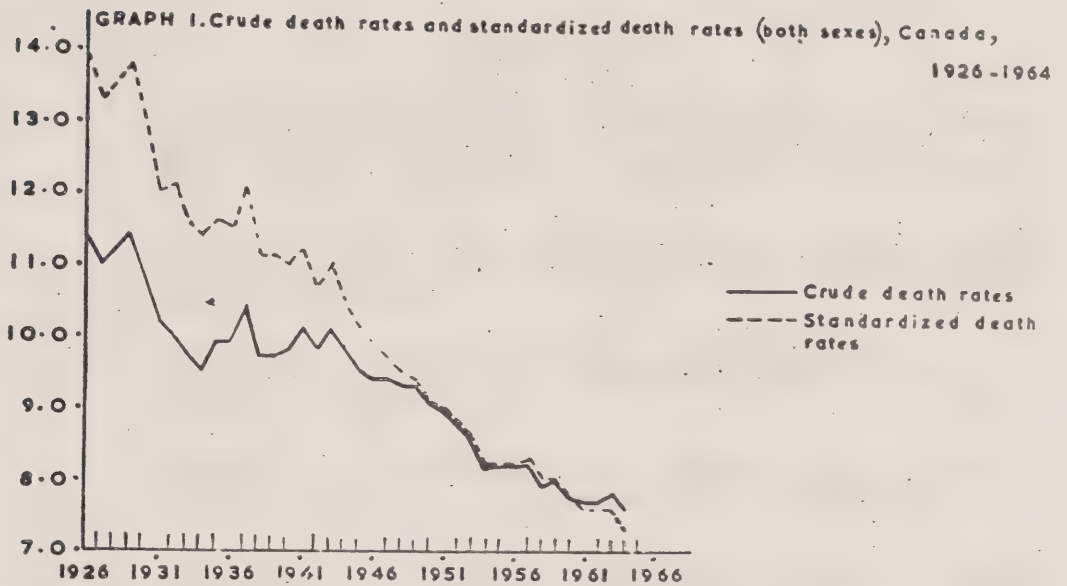
Discussion

14. The analysis indicates that there is almost a leveling off of death rates in recent years, particularly after 1954 which may be accounted for by a combination of two sets of factors acting against each other. The first is the dramatic drop in death rate for the diseases of infectious and parasitic origin which lost much of its impetus in the 1950's. As a result, the contribution of diseases of infectious origin on death rate became negligible in the recent years. Second, the so-called "new-diseases" such as cardiovascular renal diseases and cancer, and the motor vehicle accidents have become the main causes of death, particularly for middle and old ages. Because of the aging of the population, the diseases common in the adult population may have more effect in bringing about the deceleration of the rate of decline of the death rates. Hence, future trends in mortality depend to a great extent in controlling these diseases. According to a study by Woodhall and Tablon, the largest increment in life expectancy would come from the elimination of cardiovascular disease as a cause of death¹¹.

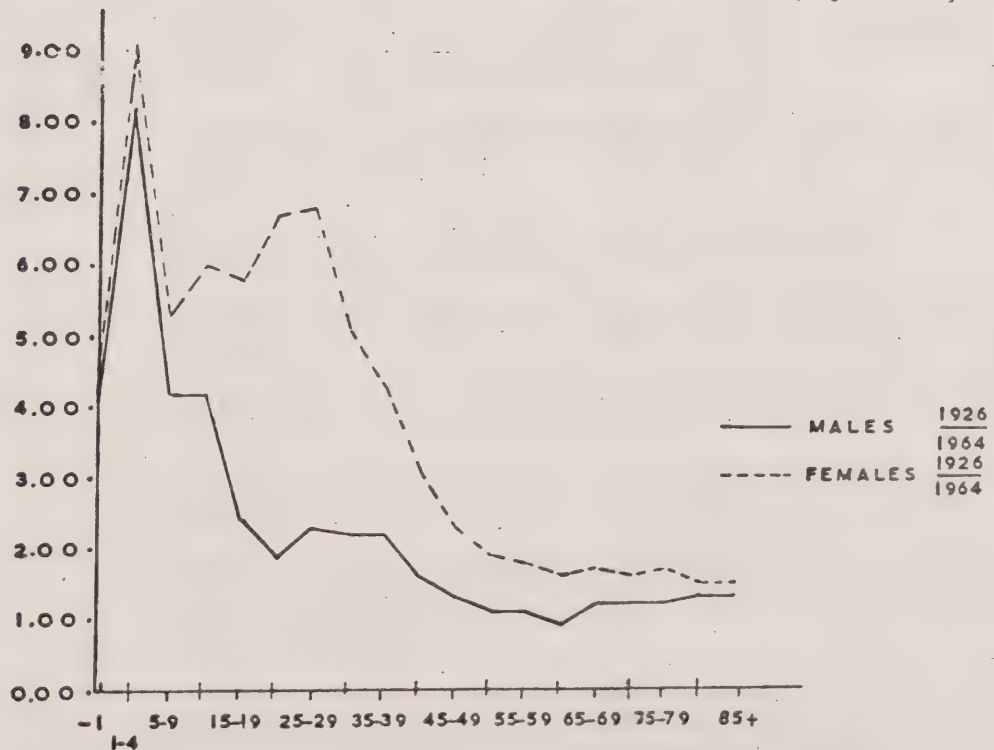
15. On the question whether Canada has reached the irreducible minimum in death rate, the examination of death rates by sex, age and cause of death indicates that further declines are possible. Also, comparison of the death rates by age and sex for various countries of low mortality around 1960 and for the provinces of Canada shows that the current death rate for Canada as a whole is not the lowest¹². Although Canada has the lowest crude death rate among the countries of Western Europe and English speaking countries elsewhere, these countries had lower death rates in a number of ages for both males and females¹³. Further, there are a number of countries in Europe and Oceania with infant mortality rates below or about 20 per 1,000 live births (the infant mortality rates for Sweden and Netherlands were 12.4 and 14.4 respectively in 1965)¹⁴. In addition, it is possible to reduce the disparity between male and female death rates in Canada. Considering these factors, it may be reasonable to expect that Canada's mortality level will reach near the lowest level recorded in countries of Europe and Oceania and some of the provinces of Canada within a few years.

FOOTNOTES

- * Paper prepared for the 1967 Conference of the International Union for the Scientific Study of Population in Sydney, Australia. The author is solely responsible for any errors or opinions in this paper.
- 1 See Dominion Bureau of Statistics, 1961 Census of Canada, General Review, Age and Sex Composition, Bulletin 7.1-4, Queen's Printer, Ottawa (1964), p. 8.
 - 2 Spiegelman, Mortimer, Recent Trends and Patterns of Mortality in Highly Developed Countries, Milbank Memorial Fund, New York (1956), pp.52-60.
 - 3 Dominion Bureau of Statistics, Vital Statistics 1961, No. 84-202 (1963), p. 128; and Vital Statistics 1965, No. 84-201 (1966), p. 21, Queen's Printer, Ottawa.
 - 4 United Nations, Demographic Year Book 1965, Department of Economic and Social Affairs, New York (1966), Table 42.
 - 5 Spiegelman, Mortimer, Recent Mortality Trends in Countries of Traditionally Low Mortality, Contributed paper for the World Population Conference, Belgrade (1965), p. 2.
 - 6 United Nations, Demographic Year Book, 1957 (Table 8); 1961, (Table 14); and 1965 (Table 42), Department of Economic and Social Affairs, New York.
 - 7 Dominion Bureau of Statistics, Vital Statistics, 1964, No. 84-202, Queen's Printer, Ottawa (1965), p. 163.
 - 8 } Dominion Bureau of Statistics, Life Expectancy Trends, 1930-1932 to
9 } 1960-1962, No. 84-518, Queen's Printer, Ottawa (1967), p. 7 and p. 9.
 - 10 See Dominion Bureau of Statistics, Vital Statistics, 1965, No. 84-201, Queen's Printer, Ottawa (1966), Table 16.
 - 11 Woodhall, Barnes and Jablon Seymour, Prospects for Further Increase in Average Longevity, Geriatrics, 12, October 1957, p. 588.
 - 12 } United Nations, Demographic Year Book, 1961, Department of Economic
13 } and Social Affairs, New York (1962), Table 14; Dominion Bureau of Statistics, Vital Statistics, 1964, No. 84-202, Queen's Printer, Ottawa (1965), Table D5.
 - 14 Moriyama, Iwao M., Infant Mortality in Certain Countries of Low Mortality, Contributed paper for the World Population Conference, Belgrade, 1965; United Nations, Demographic Year Book, 1965, Table 41.

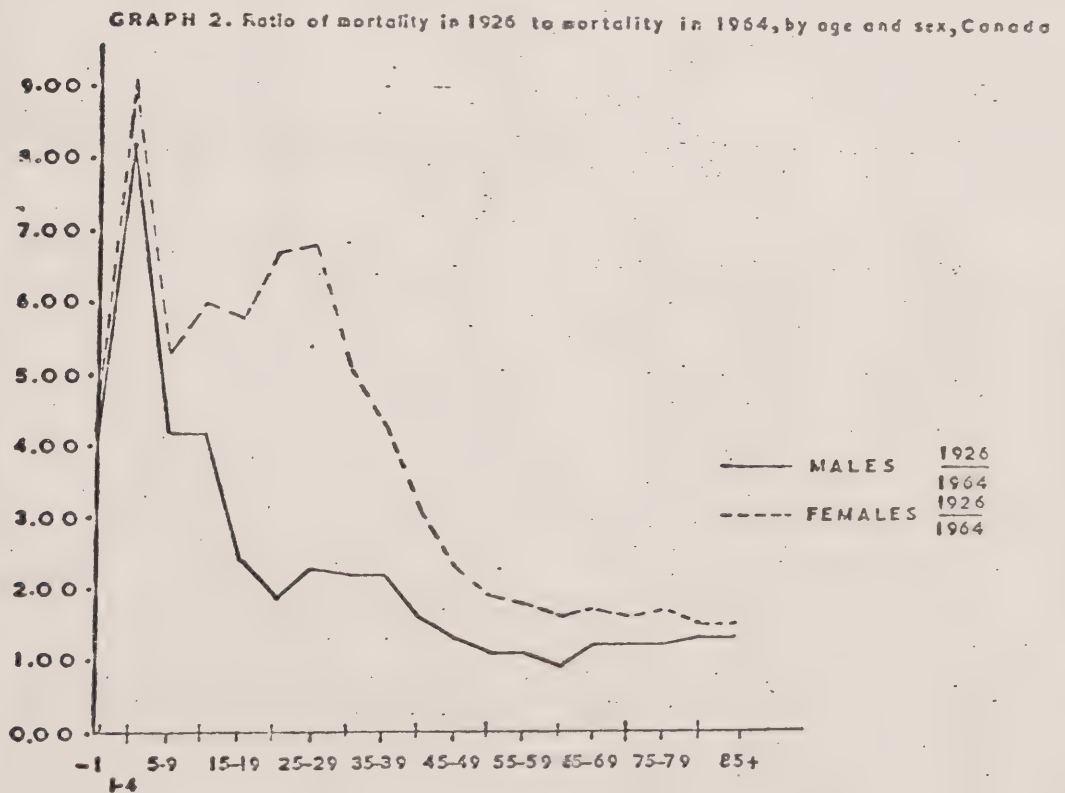
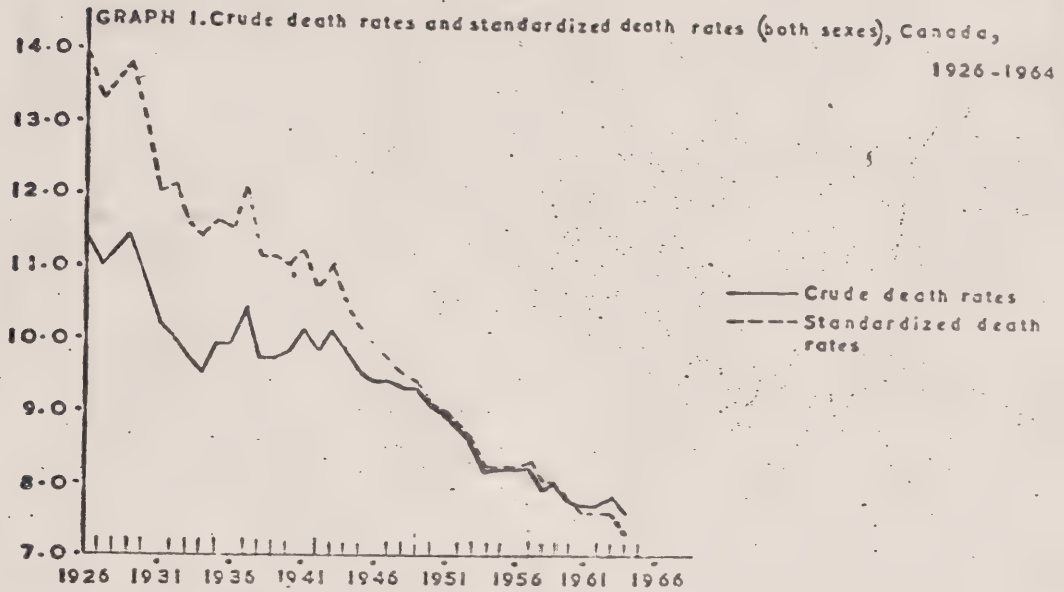


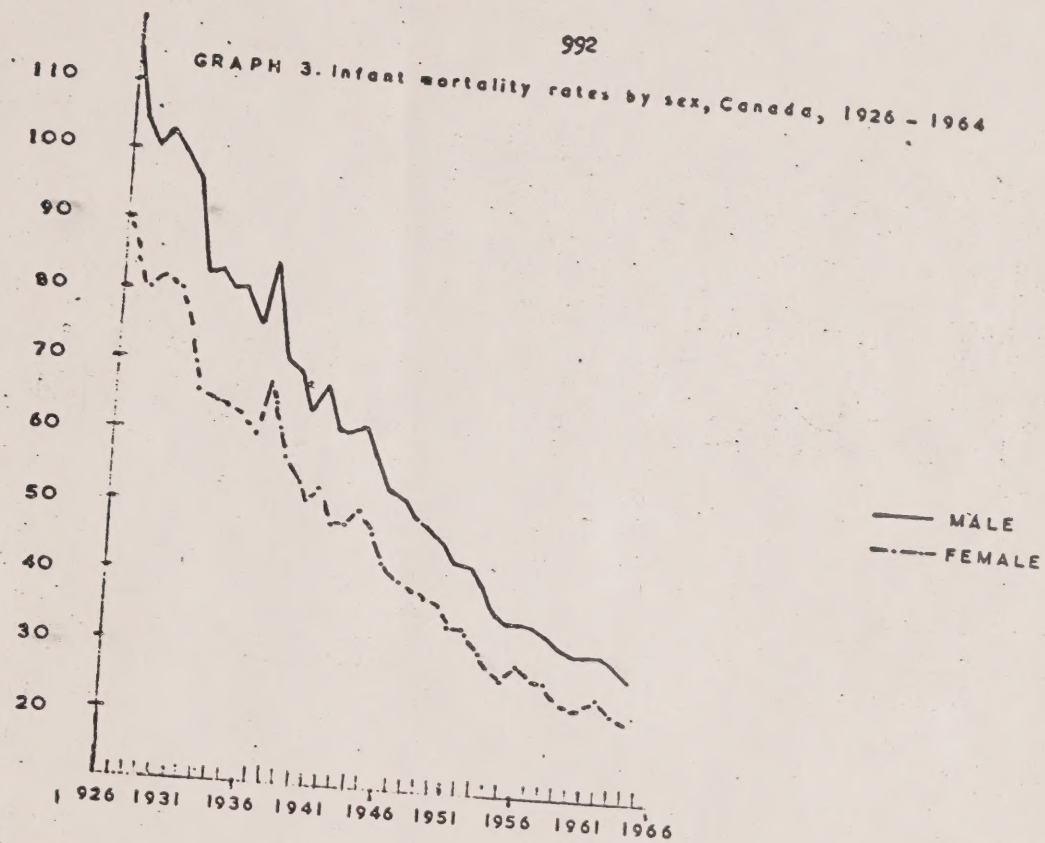
GRAPH 2. Ratio of mortality in 1926 to mortality in 1964, by age and sex, Canada



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 - 13 }
 - 14 Moriyama, Iwao M., Infant Mortality in Certain Countries of Low Mortality, Contributed paper for the World Population Conference, Belgrade, 1965; United Nations, Demographic Year Book, 1965, Table 41.





GRAPH 4. Ratio of male mortality to female mortality, by age, Canada, 1926-30 and 1964

